

### Trend Study 9-7-00

Study site name: Warren Draw .

Range type: Big Sagebrush-Grass .

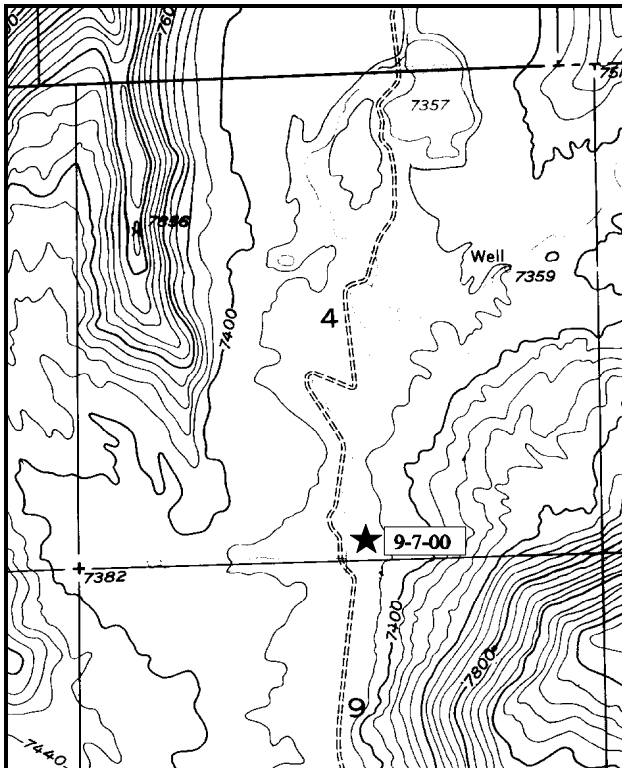
Compass bearing: frequency baseline 2°M.

First frame placement on frequency belts 5 feet. Frequency belt placement; line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

### LOCATION DESCRIPTION

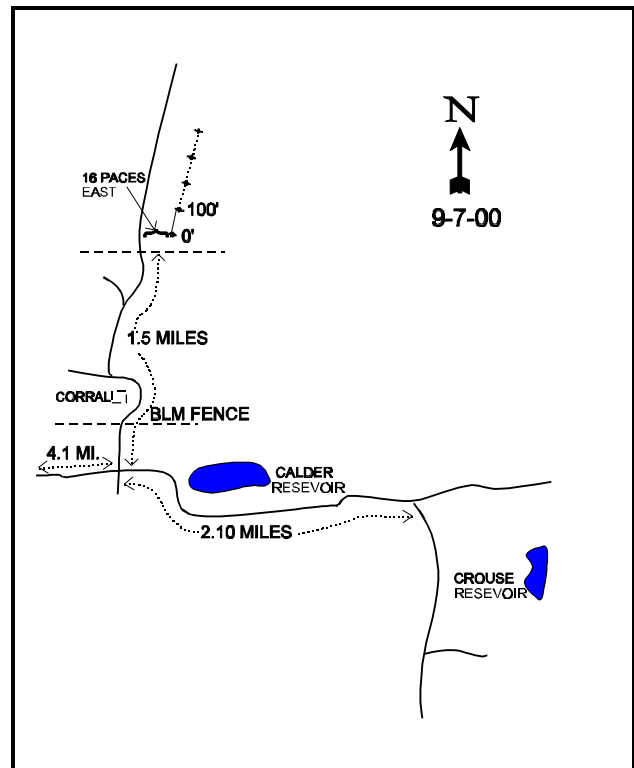
From the junction between Crouse and Calder reservoirs proceed west 2.1 miles to an intersection. Turn right (north) and go 1.5 miles, past a fence and 2 forks. On the other side of the second fence, a boundary between BLM and DWR land, stop and walk 16 paces east to the 0-foot baseline stake. The frequency baseline is marked with green steel fenceposts approximately 18 inches in height.

Alternative route: From the Diamond Mountain turnoff off US 191 travel east to an intersection just south of Matt Warner reservoir. Turn right towards Calder reservoir and proceed 4.1 miles to a fork. Turn left (north) at this fork and travel 1.5 miles passing through one fence and coming to another. On the other side of the second fence, a boundary between BLM and DWR land, stop and walk 16 paces east to the 0-foot baseline stake. The frequency baseline is marked with green steel fenceposts approximately 18 inches in height.



Map Name: Warren Draw

Township 1S, Range 24E, Section 4



Diagrammatic Sketch

UTM 4513014.101 N, 649642.413 E

## DISCUSSION

### Trend Study No. 9-7 (11-8)

The Warren Draw trend study is located just north of the DWR boundary fence in Warren Draw. The site is on a gentle (10%) west facing slope at an elevation of approximately 7,400 feet. The area is used year-round by deer and elk. There is an abundance of sage grouse sign. Water is readily available in most years with several stock ponds being found within a mile of the site. In 1995, pellet group quadrat frequency data suggested moderately low use by elk and deer. Pellet group quadrat frequency increased for both deer and elk in 2000. A pellet group transect read along the study site baseline in 2000 estimates 22 deer days use/acre (54 ddu/ha) and 8 elk days use/acre (20 edu/ha). One cattle pat was sampled in the transect in 2000.

Soil conditions are good with abundant protective ground cover from vegetation and litter and low amounts of bare soil. Soil texture is a sandy clay loam with a neutral pH. Soil depth is moderate with an estimated effective rooting depth of nearly 13 inches. Some areas close to the site contain black sagebrush indicating localized rooting depth restrictions. Rock and pavement are scarce both on the surface and within the profile. Penetrometer readings used to estimate a profile stoniness index are more indicative of soil compaction in the profile than the presence of rocks. Erosion is slight, but some pedestaling is noted around the older sagebrush stems.

The key browse species on this site is mountain big sagebrush. This sagebrush stand has on average (1995 and 2000) an estimated cover of about 19%. It has a fairly dense population with an estimated 8,940 plants/acre in 2000. Age class analysis indicates the population to be composed of 57% mature plants, 37% decadent plants, with a moderate level of recruitment from young plants at 12% in 2000. Percent decadency has varied over all sampling years. In 1982, decadency was low at 7%, increasing to a high of 51% in 1988. Decadency decreased in 1995 to 20%, but again increased in 2000 to 37%. The proportion of the population showing poor vigor also increased from 1% in 1995 to 11% in 2000. Increases in poor vigor and decadency in 2000 are primarily attributed to drought as several plants were classified with poor vigor due to a chlorotic state and/or loss of leaves. In addition, several sagebrush plants were covered with ants in 2000. Use has varied somewhat between readings. Use is currently ('00) light to moderate with moderate seed production. Recruitment has remained stable over the past three readings at 12-13%. This reproductive effort currently appears adequate to replace the decadent, dying individuals in the population. Annual growth is fairly low in 2000 averaging about 4 inches over the site.

The only other browse species sampled are slenderbush eriogonum and fringed sagebrush. Snowberry is also scattered around the area in even lower numbers. It was not picked up in the shrub density strips, but was measured for height/crown in 1995.

Even with a high density and cover of sagebrush, the herbaceous understory is abundant on this site. Grasses combined to produce nearly 15% cover in 1995 and 2000, while forbs combined for 24% cover in 1995. Ten perennial grasses were sampled in 2000, with thickspike wheatgrass, mutton bluegrass, and pinewoods needlegrass being the most abundant. These 3 species combine to produce 82% of the grass cover on the site in 2000, with light use being noted on thickspike wheatgrass. Other species include: bottlebrush squirreltail, needle-and-thread, Sandberg bluegrass, prairie junegrass, Kentucky bluegrass and a *Carex*. Perennial grasses slightly decreased in sum of nested frequency in 2000 due to drought. Forbs are diverse and abundant with 22 perennial species encountered in 1995, and 18 species in 2000. Currently ('00), forbs have decreased in cover to 15% due to drought. The dominant species are mostly mat forming and include: rose pussytoes, desert phlox and clover. Perennial forbs decreased in sum of nested frequency by nearly 30% in 2000 with the dry conditions. Annual forbs were fairly abundant in 1995, especially Douglas knotweed, but were far less abundant in 2000, again with the drought conditions.

## 1982 APPARENT TREND ASSESSMENT

Soil trend appears stable to improving. All nine categories on the apparent trend evaluation form had favorable ratings. Vegetative trend appears stable but is perhaps more precarious at least with respect to the key browse species. Mountain big sagebrush appears to be sustaining itself at the present time, but age, form and vigor class distributions tend to be borderline. Reproduction may be a problem. All of these will be important parameters to monitor in the future.

## 1988 TREND ASSESSMENT

Soil conditions have improved in some areas but declined in others. Basal vegetative cover has increased from 18% to 23%. Percent litter cover declined slightly while percent bare ground increased. The site is in good condition and the soil trend is considered stable. The key browse species, mountain big sagebrush, displays a slightly improving trend. Even though population density increased dramatically, the proportion of decadent plants also dramatically increased from 7% to 51%. Biotic potential (number of seedlings) is currently high at 28% and the proportion of young plants is good at 13%. The number of mature plants has also increased slightly. The current population could decline in the future if drought conditions persist and cause the high number of decadent sagebrush to die-off. The herbaceous trend is up due to a large increase in the quadrat frequency of grasses and forbs since 1982.

### TREND ASSESSMENT

soil - stable (3)

browse - slightly up, but with increased decadency (4)

herbaceous understory - up (5)

## 1995 TREND ASSESSMENT

Ground cover characteristics have improved in most categories since 1988. Currently, 53% of the ground surface is covered by vegetation, 65% of which consists of herbaceous plants. Percent litter has declined due to the prolonged drought, but cryptogamic cover has increased and percent bare ground has declined from 16% to 14%. Trend for soil is stable. The browse trend is slightly up for mountain big sagebrush. The number of mature plants increased, while the number of decadent shrubs declined from 51% to 20%. The only negative aspect of the browse trend is the moderate and heavy use of the sagebrush. Thirty-four percent of the plants were heavily hedged, up from 9% in 1988. Trend for the herbaceous understory is up due to a large increase in the sum of nested frequency of grasses and forbs. Three species sampled in 1988 increased significantly in nested frequency while three others declined significantly. The main difference in composition is the appearance of thickspike wheatgrass. If identification is accurate in the past, it appears that thickspike is coming into the site and squirreltail is going out.

### TREND ASSESSMENT

soil - stable (3)

browse - slightly up (4)

herbaceous understory - up (5)

## 2000 TREND ASSESSMENT

Trend for soil is stable. Vegetation and litter cover are abundant with the proportion of bare ground remaining about the same. Erosion is minimal as a result. Trend for browse is stable. Mountain big sagebrush shows increases in poor vigor and decadency, but these increases can be attributed to drought and should improve with normal precipitation in the future. Recruitment remains good at 12%, and the number of young plants is adequate to replace the decadent-dying individuals in the population if any should be lost to die-off. Use also decreased to a more moderate level compared to that in 1995. Trend for the herbaceous understory is slightly down due to drought. Sum of nested frequency slightly decreased for perennial grasses, and moderately decreased for perennial forbs.

### TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - slightly down (2)

### HERBACEOUS TRENDS --

Herd unit 09 , Study no: 7

Type	Species	Nested Frequency			Quadrat Frequency				Average Cover %	
		'88	'95	'00	'82	'88	'95	'00	'95	'00
G	Agropyron dasystachyum	a <sup>-</sup>	b <sup>265</sup>	b <sup>279</sup>	-	-	93	91	2.48	3.87
G	Agropyron intermedium	-	-	4	-	-	-	1	-	.15
G	Carex spp.	26	29	18	28	11	13	6	.14	.30
G	Festuca ovina	b <sup>20</sup>	c <sup>30</sup>	a <sup>-</sup>	7	6	15	-	.29	-
G	Koeleria cristata	b <sup>51</sup>	a <sup>9</sup>	a <sup>11</sup>	2	21	4	5	.04	.05
G	Poa fendleriana	a <sup>41</sup>	a <sup>79</sup>	b <sup>153</sup>	-	15	27	59	1.52	5.07
G	Poa pratensis	a <sup>-</sup>	b <sup>27</sup>	b <sup>10</sup>	-	-	8	3	.43	.21
G	Poa secunda	89	108	79	-	33	46	31	1.08	.98
G	Sitanion hystrix	c <sup>278</sup>	b <sup>52</sup>	a <sup>13</sup>	-	93	25	6	2.23	.25
G	Stipa comata	b <sup>57</sup>	ab <sup>65</sup>	a <sup>34</sup>	-	24	30	13	1.72	.67
G	Stipa pinetorum	188	177	136	5	73	69	55	4.61	3.60
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		750	841	737	42	276	330	270	14.58	15.18
Total for Grasses		750	841	737	42	276	330	270	14.58	15.18
F	Achillea millefolium	34	33	42	13	15	12	16	.34	.71
F	Agoseris glauca	a <sup>-</sup>	a <sup>-</sup>	b <sup>5</sup>	-	-	-	3	-	.01
F	Allium spp.	-	2	2	-	-	2	2	.01	.03
F	Antennaria rosea	191	189	196	41	75	71	76	5.49	6.70
F	Androsace septentrionalis (a)	-	b <sup>36</sup>	a <sup>18</sup>	6	-	18	9	.09	.04
F	Arabis drummondi	24	7	4	1	8	5	3	.03	.01
F	Artemisia ludoviciana	1	-	-	1	1	-	-	-	-
F	Astragalus aretioides	1	1	-	-	1	1	-	.00	-
F	Aster spp.	15	24	23	1	5	9	10	.09	.17
F	Chenopodium leptophyllum (a)	-	b <sup>6</sup>	a <sup>-</sup>	-	-	3	-	.01	-

Type	Species	Nested Frequency			Quadrat Frequency				Average Cover %	
		'88	'95	'00	'82	'88	'95	'00	'95	'00
F	<i>Collinsia parviflora</i> (a)	-	<sub>b</sub> 43	<sub>a</sub> 7	-	-	18	3	.26	.01
F	<i>Cryptantha</i> spp.	-	1	-	-	-	1	-	.00	-
F	<i>Delphinium nuttallianum</i>	-	6	-	-	-	2	-	.03	-
F	<i>Descurainia pinnata</i> (a)	1	1	-	-	1	1	-	.00	-
F	<i>Draba</i> spp. (a)	-	-	3	-	-	-	2	-	.01
F	<i>Erigeron eatonii</i>	<sub>b</sub> 136	<sub>b</sub> 157	<sub>a</sub> 65	52	62	64	34	.62	.37
F	<i>Erigeron flagellaris</i>	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 11	-	-	-	7	-	.11
F	<i>Gayophytum ramosissimum</i> (a)	-	<sub>b</sub> 18	<sub>a</sub> -	-	-	8	-	.09	-
F	<i>Heterotheca villosa</i>	-	2	-	-	-	1	-	.00	-
F	<i>Hymenoxys richardsonii</i>	3	3	3	2	1	1	1	.03	.03
F	<i>Lupinus argenteus</i>	24	44	17	21	10	25	9	1.44	.56
F	<i>Lychnis drummondii</i>	<sub>a</sub> -	<sub>b</sub> 5	<sub>a</sub> -	5	-	3	-	.06	-
F	<i>Microsteris gracilis</i> (a)	-	6	2	-	-	4	1	.02	.00
F	<i>Navarretia</i> spp.	<sub>a</sub> -	<sub>b</sub> 14	<sub>a</sub> -	-	-	6	-	.08	-
F	<i>Orthocarpus luteus</i> (a)	-	<sub>b</sub> 109	<sub>a</sub> 30	-	-	42	16	3.04	.16
F	<i>Orobancha</i> spp.	-	2	-	-	-	1	-	.00	-
F	<i>Penstemon</i> spp.	<sub>b</sub> 13	<sub>a</sub> 1	<sub>ab</sub> 6	-	7	1	3	.00	.09
F	<i>Phlox austromontana</i>	<sub>b</sub> 234	<sub>a</sub> 172	<sub>a</sub> 161	48	84	55	61	10.77	5.90
F	<i>Phlox longifolia</i>	<sub>a</sub> 52	<sub>b</sub> 81	<sub>a</sub> 39	4	26	39	14	.34	.07
F	<i>Polygonum douglasii</i> (a)	-	<sub>b</sub> 161	<sub>a</sub> 12	-	-	60	6	.59	.03
F	<i>Potentilla gracilis</i>	-	2	6	2	-	1	2	.03	.01
F	<i>Taraxacum officinale</i>	<sub>ab</sub> 18	<sub>b</sub> 38	<sub>a</sub> 16	-	9	17	8	.13	.21
F	<i>Tragopogon dubius</i>	-	-	3	-	-	-	2	-	.01
F	<i>Trifolium gymnocarpon</i>	<sub>a</sub> -	<sub>c</sub> 113	<sub>b</sub> 41	37	-	49	17	.27	.23
F	Unknown forb-annual (a)	-	3	-	-	-	1	-	.00	-
F	Unknown forb-perennial	<sub>b</sub> 11	<sub>a</sub> -	<sub>a</sub> -	3	6	-	-	-	-
F	<i>Zigadenus elegans</i>	<sub>a</sub> -	<sub>ab</sub> 3	<sub>b</sub> 12	-	-	1	5	.00	.12
Total for Annual Forbs		1	383	72	0	1	155	37	4.12	0.26
Total for Perennial Forbs		757	900	652	237	310	367	273	19.82	15.39
Total for Forbs		758	1283	724	237	311	522	310	23.94	15.65

Values with different subscript letters are significantly different at  $\alpha = 0.10$

# BROWSE TRENDS --

Herd unit 09 , Study no: 7

T y p e	Species	Strip Frequency		Average Cover %	
		'95	'00	'95	'00
B	Artemisia frigida	0	1	-	-
B	Artemisia tridentata vaseyana	99	97	20.41	18.76
B	Eriogonum microthecum	3	3	.03	.01
Total for Browse		102	101	20.45	18.77

# BASIC COVER --

Herd unit 09 , Study no: 7

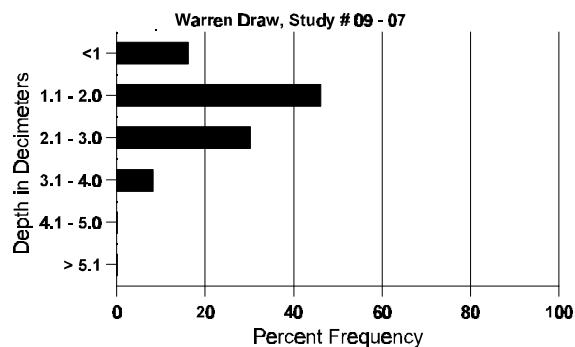
Cover Type	Nested Frequency		Average Cover %			
	'95	'00	'82	'88	'95	'00
Vegetation	379	369	18.25	23.00	53.39	57.93
Rock	28	8	1.25	1.50	.16	.08
Pavement	14	24	0	0	.07	.09
Litter	394	388	65.50	59.00	50.50	66.19
Cryptogams	90	77	.25	.50	1.31	1.22
Bare Ground	264	214	14.75	16.00	13.86	13.88

# SOIL ANALYSIS DATA --

Herd Unit 09, Study # 7, Study Name: Warren Draw

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.93	60.0 (13.46)	6.6	63.4	16.7	19.9	2.1	20.4	265.6	0.8

# Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 09 , Study no: 7

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'95	'00	'00	'00
Rabbit	3	13	218	N/A
Elk	14	21	104	8 (20)
Deer	10	24	287	22 (55)
Cattle	2	1	9	1 (2)
Moose	-	-	35	2 (5)
Antelope	-	-	18	1 (2)

BROWSE CHARACTERISTICS --

Herd unit 09 , Study no: 7

A Y G R E	Form Class (No. of Plants)	Vigor Class								Plants Per Acre	Average (inches)		Total				
		1	2	3	4	5	6	7	8		9	1		2	3	4	Ht. Cr.
Artemisia frigida																	
M	82	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	88	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	95	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	00	1	-	-	-	-	-	-	-	-	1	-	-	-	20	4	5
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>			
		'82				00%				00%				00%			
		'88				00%				00%				00%			
		'95				00%				00%				00%			
		'00				00%				00%				00%			
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-		
												'88	0		-		
												'95	0		-		
												'00	20		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Artemisia tridentata vaseyana																		
S	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	88	40	-	1	4	-	-	-	-	-	43	-	1	1	3000		45	
	95	7	-	-	-	-	-	-	-	-	7	-	-	-	140		7	
	00	4	-	-	-	-	-	-	-	-	4	-	-	-	80		4	
Y	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	88	14	5	-	2	-	-	-	-	-	19	2	-	-	1400		21	
	95	27	11	9	-	-	-	-	-	-	47	-	-	-	940		47	
	00	43	5	-	5	-	-	-	-	-	52	-	1	-	1060		53	
M	82	25	15	13	-	-	-	-	-	-	53	-	-	-	3533	18 31	53	
	88	8	41	8	1	-	-	-	-	-	53	1	4	-	3866	21 25	58	
	95	83	75	83	6	-	-	-	-	-	247	-	-	-	4940	16 29	247	
	00	154	61	14	-	-	-	-	-	-	228	1	-	-	4580	17 29	229	
D	82	-	2	2	-	-	-	-	-	-	-	-	4	-	266		4	
	88	21	55	6	-	-	-	-	-	-	71	1	6	4	5466		82	
	95	15	24	32	-	1	-	-	-	-	67	-	-	5	1440		72	
	00	108	43	8	2	4	-	-	-	-	111	4	-	50	3300		165	
X	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	840		42	
	00	-	-	-	-	-	-	-	-	-	-	-	-	-	1120		56	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		30%			26%			07%			+65%							
'88		63%			09%			09%			-32%							
'95		30%			34%			01%			+18%							
'00		25%			05%			11%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	3799	Dec:	7%			
												'88	10732		51%			
												'95	7320		20%			
												'00	8940		37%			
Eriogonum microthecum																		
M	82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	0	
	95	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4 15	5	
	00	3	-	-	-	-	-	-	-	-	1	-	2	-	60	6 9	3	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'82		00%			00%			00%										
'88		00%			00%			00%										
'95		00%			00%			00%			-40%							
'00		00%			00%			67%										
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'88	0		-			
												'95	100		-			
												'00	60		-			



A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Symphoricarpos oreophilus																		
M	'82	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'88	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	'95	-	-	-	-	-	-	-	-	-	-	-	-	-	0	13	11	0
	'00	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
% Plants Showing		<u>Moderate Use</u>				<u>Heavy Use</u>				<u>Poor Vigor</u>				<u>%Change</u>				
		'82 00%				00%				00%								
		'88 00%				00%				00%								
		'95 00%				00%				00%								
		'00 00%				00%				00%								
Total Plants/Acre (excluding Dead & Seedlings)												'82	0	Dec:	-			
												'88	0		-			
												'95	0		-			
												'00	0		-			